cardiac in 77% of LF/LG patients (80/117) and 70% of those with NF/LG (47/78); P=0.02. No clinical strokes or TIA were observed in the 30 days after procedure in any of the patients.

Conclusions: Invasive hemodynamic assessment of AS utilizing a pressure wire can be beneficial, safe and it may provide better discrimination to Echocardiography in identifying true severe in patients with LF/LG and NF/LG severe AS with preserved EF.

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Coronary flow reserve increases after aortic valve replacement: one year echocardiographic observation

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Background and purpose: Aortic stenosis (AS) leads to left ventricle pressure overload and muscle hypertrophy. These changes influence to coronary physiology. Objective of the study was to assess changes in coronary flow reserve (CFR) in patients with severe AS after aortic valve replacement (AVR).

Methods: Transthoracic echocardiography (TTE) was performed in 38 subjects with severe AS. Significant stenoses of epicardial arteries were excluded based on angiograms. CFR was measured noninvasively with Doppler echocardiography. Maximal blood flow velocity was measured in left anterior descending artery (LAD) at baseline (VO) and during peak hyperaemia (Vmax), achieved with IV flushing infusion of dipyridamole (0.56 mg/kg). CFR was calculated as VO/Vmax. All echocardiographic measurements were performed prior AVR and subsequently in 3, 6 and 12 follow-up months.

Results: Observation was completed in 36 patients with severe AS (mean AVA 0.78 cm sq.; mean age 58.7 years (SD = 12.6), 50% women. Median CFR prior AVR was 1.65 (range: 1.12–2.17). Significant improvement of CFR was observed after 3 months (median 2.21 [1.17–3.53]; P<0.05). This effect was maintained with no significant changes after 6 and 12 months (2.23 [1.17–3.53] and 2.24 [1.60–3.76] respectively; P<0.07). There was significant VO reduction 3 months post AVR (0.29–0.66) vs. 0.29 [0.21–0.52] m/s; P<0.05) with no further changes. There was slower increase of Vmax with significance after 6 months (0.62 [0.39–0.62] vs. 0.66 [0.39–0.98] m/s; P<0.05). In pre-AVR exams we observed correlations between CFR and AV peak velocity (r=−0.39; P=0.009), CFR - mean pressure (r=−0.37; P=0.03) and CFR - left ventricle mass indexed to body surface area (r=−0.036; P=0.032).

Conclusions: Severe aortic stenosis is coexistent with impaired CFR. Study showed significant improvement of CFR after cardiac surgery, the effect was maintained after 12 months. There was early decrease (3 months) of coronary blood flow velocity in resting conditions and late (6 months) increase during hyperaemia.

CFR was related with AV hemodynamic parameters and left ventricle mass index.

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Association between left ventricular diastolic function and RV function and morphology in asymptomatic aortic stenosis at rest and during exercise

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Background: Aortic stenosis (AS) is a progressive disease where left ventricular (LV) contractile function is preserved. However, the association between diastolic dysfunction and right ventricular (RV) loading conditions and function has poorly been investigated in asymptomatic patients.

Purpose: To assess the association between RV function and LV diastolic function in asymptomatic patients with AS.

Methods: Forty-one patients underwent right heart catheterization and simultaneous echocardiography at rest and at maximal supine exercise and were stratified according to resting diastolic function. Cardiac chamber size and morphology were assessed by cardiac magnetic resonance (MRI). RV stroke work index, pulmonary artery (PA) compliance, PA elastance, PA pulsatility index and right atrial pressure (RAP) were calculated at rest and maximal exercise.

Results: Ten patients (24%) had normal diastolic function, 20 patients (49%) had grade 1 and 11 patients (27%) had grade 2 diastolic dysfunction. RV end-diastolic (79±15 vs. 66±11 mmHg, P<0.02) and end-systolic (32±9 vs. 25±7 mmHg, P<0.04) volumes were significantly lower in patients with diastolic dysfunction compared to normal filling. An increased RAP with exercise >15 mmHg was not seen in patients with normal LV filling opposed to 4 patients (20%) with mild and 7 patients (63%) with moderate diastolic dysfunction, P=0.003. PA pressure and PA elastance was increased in grade 2 diastolic dysfunction and correlated with RV volumes and maximal oxygen consumption (r=-0.71, P<0.001), figure 1.

Conclusions: Moderate diastolic dysfunction is associated with increased RV afterload which is compensated for at rest but with exercise associated with increased RAP and inversely related to maximal oxygen consumption.

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Anatomic aortic valve area by multi-detector computed tomography: pilot study of semi-automatic custom software assessment compared to doppler-echocardiography

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Background: In patients with aortic valve stenosis (AVS), the measurement of aortic valve area (AVA) is a major prognostic indicator. Doppler echocardiography was assessed by cardiac magnetic resonance (MRI). RV stroke work index, pulmonary artery (PA) compliance, PA elastance, PA pulsatility index and right atrial pressure (RAP) were calculated at rest and maximal exercise.
allows the calculation of the effective AVA, but the accuracy of this measure-
ment has been criticized and is not part of core guidelines. Multidetector com-
puted tomography (MDCT) supports AS diagnosis using valvar calcium scor-
ing and MDCT can delineate aortic cusps, but anatomical AVA measure remains
untested.

**Purpose:** To compare the measurement of 4D-MDCT derived anatomical AVA, ob-
tained with new, custom-made software, with effective AVA by transthoracic eco-
cardiography (TTE) continuity equation.

**Methods:** Twenty patients with severe AS and clinically indicated 4D-MDCT of
the aortic valve were included. AVA was obtained using continuity equation for
Doppler-Echocardiography. Using 4D-MDCT with contrast after imaging re-
registration, custom semi-automated software allowed aortic cusp delineation and
anatomical AVA measurement. With this software, a systolic 3D model of the
valve is obtained after cusps' profiling using 18 automatically generated long-axis
planes (Figure, top panel). Then, orifice area (anatomical AVA) was automatically
calculated using different algorithms (Figure, bottom panel): by using smallest
2D-projection of aortic cusps profile (method A), by computing 2D area of cusps'
free margin (B), and by using any plane (yellow) with the smallest area
between cusps (C).

**Results:** In 18 out of 20 patients (80%) MDCT image quality allowed complete
delineation of aortic cusps. AVA by Doppler-Echo was 82±15 mm². Anatomical AVA
measured 80x16 mm² for method-A, 88±20 mm² for method-B, 93±21 mm² for
method-C, and 87±19 mm² when averaging over the three methods. Absolute dif-
ferences between Echo and 4D-MDCT measurements were 7.7±4.6 mm² (p for
difference=0.3; r=0.85, p<0.0001) for method-A; 9.2±6.8 mm² (p for differen-
te=0.074; r=0.86, p<0.0001) for methods-B; 1.9±4.1 mm² (p for difference=0.0002; r=0.90, p<0.0001) for method-C, and 7.7±6.5 mm² (p for difference=0.003; r=0.89,
p<0.0001) for the average. Analysis of regression slopes >1 (echo lower than
MDCT) was observed for methods-B, -C, and -average (1.26, 1.13, and 1.11 re-
spectively) but was 0.93 for method-A.

**Conclusions:** The present pilot study introduces a promising method to quantify
anatomic AVA by contrast 4D-MDCT. This approach is highly feasible and pro-
vides detailed visualization of the complex stenotic orifice. Good correlation with
Echo and expected slightly larger anatomical orifice measurements were observed.
Hence, this approach is promising for the goal of developing a method indepen-
dent of Doppler-Echo to assess anatomical AS severity in combination with aortic
valve calcification load using semi-automated 4D-MDCT interpretation.

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**P1641 | BEDSIDE**

**Reclassification of low-gradient severe aortic stenosis by three-dimensional transthoracic echocardiography**

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**Introduction:** Aortic stenosis (AS) severity is defined by functional aortic valve
area (AVA) in association with peak and mean transvalvular pressure gradient
(MPG), with an MPG > 40 mmHg or AVA < 1 cm² indicating a severe stenosis. Discrepancy between a severely reduced AVA and MPG is frequently encountered in clinical practice among patients with normal left ventricular function, these pa-
tients were classified as Low flow-low gradient paradoxical aortic stenosis (LF-LG) or
normal flow-low gradient (NF-LG) according to measured indexed stroke vol-
ume (LF is defined as SVI < 35 ccm/m²). This discrepancy may be due to the assump-
tion of a circular shape for left ventricular outflow tract (LVOT), while it actu-
ally has an elliptic shape, as shown by computed tomography or three di-
mensonsal tranesophageal echocardiographic studies.

**Purpose:** Test the effect of direct measure of LVOT area by three dimensional
transthoracic echocardiography (3D-TTE) on AS classification by AVA.

**Methods:** Population: 64 patients with a new diagnosis of aortic valve stenosis
(peak flow velocity > 2.6 m/sec) and EF > 50%; 2D-TTE: AVA was calculated by
traditional continuity equation (AVAi). LVOT area was calculated from the diam-
eter measured on parasternal long axis view. 3D-TTE: 3D data set including aortic
valvular complex and LVOT was obtained and LVOT planimetry was performed,
then it was used in continuity equation to estimate AVA (AVAd).

**Results:** 14 of the total 64 (22%) were excluded because of inadequate im-
age quality. Analysis was performed on the remaining 50 patients (mean age
76.5±8.42 years, 58% male). 40 patients had severe AS with an AVA trad. 1 cm².
Mean LVOT3D resulted to be higher than mean LVOTrad (3.916±0.530 cm² vs 2.983±0.669 cm², p<0.001). As expected, mean AVAd was greater than
AVAd, 1029±0.333 cm² vs 0.783±0.260 cm², p<0.001. Both AVAd and
AVAd had a significant correlation with MPG (r=0.684 and r=0.739 respectiv-
ely, p<0.001 for both). Among the 40 patients with severe AS by AVAd, accord-
ing to AVAd: 19/20 patients with NF-HG/LF-HG remained in the same category, 5/8
patients with LF-LG and 12/13 with NF-LG were reclassified as non severe AS.

**Conclusion:** 3D-TTE derived functional AVA allowed to reclassify AS severity in
81% (17/21) of patients with discrepant AVAi and MPF (LF-LG or NF-LG).

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**P1642 | BEDSIDE**

**Left atrial dysfunction as a pathway to heart failure symptoms in patients with severe aortic stenosis and preserved left ventricular ejection fraction**

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**Background:** Although prognosis in asymptomatic patients (pts) with severe aor-
tic stenosis (AS) is relatively benign, the risk increases abruptly with symptom-
tral occurrence. The relationship between left atrium (LA) dysfunction and heart failure (HF) symptoms has been demonstrated in several settings of left ventricular (LV)
myocardial dysfunction such as HF with preserved LV ejection fraction (LVEF)
or hypertrophic cardiomyopathy. However, data regarding the contribution of LA
dysfunction to the patients’ symptoms in severe AS is scarce.

** Aim:** We aimed to evaluate the usefulness of LA function over other parameters
related to the symptomatic status (eg BNP serum values, LV global longitudinal
strain - GLS, LA size, Ea/E' ratio) in stratifying the risk of pts with severe AS.

**Methods:** We prospectively enrolled 291 consecutive pts (66±11 yrs, 57% men)
with severe AS (indexed aortic valve area, AVAi < 0.6 cm²/m²) and preserved
LVEF (>50%), in sinus rhythm, with no more than mild aortic or mitral regurgita-
tion. Patients were divided in two groups based on the presence of HF symptoms:
symptomatic (238) or asymptomatic (53 pts). A negative exercise echocardi-
ogram/ECG test was required to confirm the asymptomatic status. A comprehen-
sive echocardiogram was performed in all patients. Left ventricular and LA defor-
mation parameters were assessed using speckle tracking echocardiography.

**Results:** No significant differences were found between symptomatic and asymptom-
tic pts regarding age (66±10 vs 64±12 yrs), cardiovascular risk factors and
cormorbidities (ie smoking, hypertension, dyslipidemia, chronic kidney disease)
p<0.10 for all). Left ventricular EF and geometry - diameters, volumes, LV mass
index (146±38 vs 146±38 g/m²), relative wall thickness and E/e'average ratio (0.72 vs
1.9±1.0 vs 0.4±1.1, p=0.0019). LV (48±15 vs 43±15, p=0.033) and PAPs (349 vs
30±8 mmHg, p=0.029) were significantly higher, whereas GLS (14.6±3.6 vs
13.5±4.8) were similar between groups (p=0.10 for all) despite a higher a
AVAi in asymptotic pts (0.44 vs 0.39 cm²/m², p<0.001). Moreover, in symp-
tomatic pts BNP values (in BNP, 5.4±1.0 vs 4.3±1.0, p=0.019), LAVI (48±15 vs
43±15, p<0.001) and PAPs (349 vs 30±8 mmHg, p=0.029) were significantly
higher, whereas GLS (-14.6±3.6 vs -15.2±3.4%, p=0.026), peak LA longitudinal
strain (17.7±3 vs 23.7±7, p<0.001) and strain rate parameters (SSr, ESr, ASr,
p<0.001) were significantly lower compared to asymptomatic pts. In the multi-
variable analysis, peak LA longitudinal strain was the only independent correlate
of HF symptoms (p<0.011).

**Conclusions:** Peak LA longitudinal strain is an independent correlate of the pres-
ence of HF symptoms in patients with severe AS and preserved LVEF. A non-
invasive echocardiographic evaluation of LA function would be useful to improve
risk stratification in this clinical setting.